

**BY ORDER OF THE  
SECRETARY OF THE AIR FORCE**

**AIR FORCE OCCUPATIONAL SAFETY AND  
HEALTH STANDARD 91-31**

**1 OCTOBER 1997**

**Safety**



**PERSONAL PROTECTIVE EQUIPMENT**

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(SMSgt Pennie Hardesty)  
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The criteria in this standard are the Air Force's minimum safety, fire prevention, and occupational health requirements for protective clothing and equipment (PPE). Major commands (MAJCOM), direct reporting units (DRU), and field operating agencies (FOA) may supplement this standard when additional or more stringent safety and health criteria are required. Refer to Air Force Instruction (AFI) 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Programs* (formerly Air Force Regulation [AFR] 127-12), for instructions on processing supplements or variances. Report conflicts in guidance between this standard, federal standards, or other Air Force directives through MAJCOM, DRU, or FOA ground safety offices to Headquarters Air Force Safety Center, Ground Safety Division, Safety Engineering and Standards Branch (HQ AFSC/SEGS), 9700 G Avenue, SE, Suite 222D, Kirtland AFB, NM 87117-5670.

**SUMMARY OF REVISIONS**

Removes the total prohibition on the use of contact lenses with respirators by allowing use of soft and gas permeable contact lenses in order to be in line with changes to AFOSH Standard 48-1, Respiratory Protection Program (paragraph 3.1.10).

This standard applies to all US Air Force organizations, including all US Air Force Reserve personnel and when Air National Guard are on federal service. Essential regulatory requirements contained in Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulation (CFR) 1910.132, *Personal Protective Equipment, General Requirements*; 133, *Eye and Face Protection*; 135, *Head Protection*; 140, *Standards Organization*; and portions of non-regulatory consensus standards, such as the National Safety Council's *Accident Prevention Manual for Business and Industry*, and applicable sections of existing AFOSH standards have been incorporated into this standard. Normal work or seasonal clothing is not covered by this standard. US Air Force Fire Protection clothing and equipment, respiratory protection, aircrew protective clothing, chemical warfare clothing, laser radiation, welding, cutting and brazing operations and protection against bloodborne pathogens are also not addressed. Refer to the following publications for information on these areas:

- a. Fire Protection Clothing and Equipment - National Fire Protection Association (NFPA) and OSHA Standards.
- b. Respiratory Protection - AFOSH Standard 48-1, *Respiratory Protection Program*, and OSHA 1910.134, *Respiratory Protection*.
- c. General Flight Rules - AFI 11-206 and Technical Order (TO) 14P3-1-131, *OPN and Maintenance Instruction With IPB — Aircrew Chem-Defense Ensemble*.
- d. Ground Crew Chem-Defense Ensemble - TO 14P3-1-141, *Operation and Maintenance Instructions — Ground Crew Chem-Defense Ensemble*.
- e. Health Hazards Control for Laser Radiation - AFOSH Standard 161-10.
- f. Welding, Cutting, and Brazing - AFOSH Standard 91-5.
- g. Bloodborne Pathogens. OSHA Standard 29 CFR 1910.1030, *Bloodborne Pathogens*; OSHA 3127, *Occupational Exposure to Bloodborne Pathogens*; OSHA 3128, *Bloodborne Pathogens and Acute Care Facilities*; OSHA 3129 *Controlling Occupational Exposure to Bloodborne Pathogens in Dentistry*; OSHA 3130, *Occupational Exposure to Bloodborne Pathogens: Precautions for Emergency Responders*, and OSHA 3131, *Bloodborne Pathogens and Long-Term Care Workers*. For information on OSHA guidance, contact the installation ground safety staff.

## Chapter 1

### HAZARDS AND HUMAN FACTORS

**1.1. Hazards.** Hazards should be engineered out, isolated, guarded against or a safer chemical used as a substitute whenever possible before considering the use of PPE. PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

1.1.1. The supervisor shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitates the use of PPE. If such hazards are present, or likely to be present, the supervisor shall conduct a JSA to identify hazards and PPE required for a particular task. Next, a Job Safety Outline (lesson plan) is accomplished which contains all the job safety training the workers will require (JSAs may be incorporated into the Job Safety Outline) and finally, when the worker receives their training, it is documented on the AF Form 55, **Employee Safety and Health Record**. The supervisor may maintain these three documents together or as separate documents. The AF Form 55 (when signed) certifies that job safety training has been conducted. It is not a replacement for the job safety outline or JSA. See AFI 91-202, *The US Air Force Mishap Prevention Program* (formerly designated AFR 127-2), and AFI 91-301 for further information on the JSA, Job Safety Outline, and AF Form 55. **NOTE:** A JSA is not required whenever appropriate guidance covers all safety requirements of an operation or process. Examples are: *TO 00-25-172, Ground Servicing of Aircraft and Static Grounding/Bonding*, and *TO 1-1-3, Inspection and Repair of Aircraft Integral Tanks and Fuel Cells*.

1.1.2. It is necessary to consider certain general guidelines for assessing the eye, face, head, hearing, respiratory, torso, hand, arm, foot, and leg hazards that exist in occupational operations. When PPE is required, the identified or potential hazard must be matched to the proper protective devices. This is accomplished by reviewing the JSA and material safety data sheets (MSDS) for the task being accomplished. Contact the installation ground safety or bioenvironmental engineering staffs for assistance.

**1.2. Job Safety Analysis (JSA) (see definition in attachment 1).** Supervisor's outlines (lesson plans) for the AF Form 55 can be modified to include this requirement. The prescribing directives for conducting JSAs are AFIs 91-202 and 91-301 and OSHA Standard CFR 1910.132. See **Attachment 2** for a sample JSA.

**1.2.1. Documentation.** Each workcenter must conduct and document JSAs where appropriate. JSAs will include the following data:

1.2.1.1. Work procedure evaluated;

1.2.1.2. Person certifying evaluation has been performed.

**NOTE:**

Person's signature certifies that the JSA has been conducted.

**1.2.2. Training.** Training must include:

1.2.2.1. When PPE is necessary;

1.2.2.2. What PPE is necessary;

- 1.2.2.3. How to don, take off, adjust, and wear PPE;
- 1.2.2.4. Limitations of PPE;
- 1.2.2.5. Care, maintenance, useful life, and disposal of PPE; and
- 1.2.2.6. An opportunity for each employee to demonstrate understanding of training and ability to use PPE properly (hands-on training **prior** to work).
- 1.2.2.7. Retraining is required when:
  - 1.2.2.7.1. Employee exhibits a lack of understanding or skill with the required PPE;
  - 1.2.2.7.2. Changes in the workplace render previous training obsolete; or
  - 1.2.2.7.3. Changes in the types of PPE used render previous training obsolete.
- 1.2.2.8. Supervisor must verify affected employees have received and understand required training through written certification that contains:
  - 1.2.2.8.1. Name of each employee trained;
  - 1.2.2.8.2. Dates of training; and
  - 1.2.2.8.3. Subject of certification.

**NOTE:**

This should be documented on an AF Form 55 (i.e: respirator, fire extinguisher, protective eye wear).

**1.3. Human Factors:**

- 1.3.1. Human factors fall into two major categories:
  - 1.3.1.1. Mental: such as attitude, emotion, job or domestic pressure, distractions, hurrying, or job knowledge; and
  - 1.3.1.2. Physical: such as fatigue, physical strength, and reactions to prescription medications or drugs.
- 1.3.2. These factors can affect workers who, by their commission — what they do, or by their omission — what they fail to do, contribute to or cause a mishap. Some examples are:
  - 1.3.2.1. Ignoring directives from supervisors.
  - 1.3.2.2. Improper operation of equipment while angry or distracted.
  - 1.3.2.3. Being distracted from job tasks while thinking of personal problems.
  - 1.3.2.4. Not following proper procedures or taking shortcuts because of a feeling of being behind or hurried.
  - 1.3.2.5. Being drowsy on the job, which may be caused by improperly taking medications or alcohol or drug abuse.
  - 1.3.2.6. Unauthorized use of equipment when not fully qualified.

## Chapter 2

### RESPONSIBILITIES

**2.1. Air Staff.** All Air Staff elements will ensure policies and procedures are consistent with the spirit and intent of this standard.

**2.2. Air Force Chief of Safety (HQ AF/SE).** Will establish policy for control of the PPE program.

**2.3. Air Force Safety Center (HQ AFSC ).** Will:

2.3.1. Establish standards for safety programs associated with PPE.

2.3.2. Provide professional advice and guidance applicable to PPE.

2.3.3. Act as approval authority for variances to AFOSH standard requirements.

**2.4. Air Force Inspection Agency (HQ AFIA).** Will implement inspection programs to ensure compliance with requirements of this standard.

**2.5. Air Force Surgeon General (HQ AF/SG).** Will provide professional advice and guidance applicable to occupational health personal protective equipment (OH-PPE).

**2.6. Air Force Civil Engineering Support Agency (HQ AFCESA/CEXF).** Will provide professional advice and guidance applicable to PPE in the realm of fire protection and emergency rescue.

**2.7. Air Force Education and Training Command (HQ AETC) and Air Force Materiel Command (HQ AFMC) through United States Air Force School of Aerospace Medicine (USAFSAM).** Will ensure that all technical courses involved with PPE requirements include, as a minimum, the information provided in this standard.

**2.8. Major Commands (MAJCOM), Direct Reporting Units (DRU), and Field Operating Agencies (FOA).** Will provide program oversight and supplements, as necessary.

**2.9. Installation Chief of Safety (SE).** With assistance from the ground safety staff, the Chief of Safety will:

2.9.1. Serve as focal point for implementing this standard.

2.9.2. Verify that all installation organizations have implemented a hazard assessment program, which includes JSAs (see paragraphs 1.1.1., 1.2. and 3.2.4.2. for more on JSAs), Job Safety Training Outlines, and AF Forms 55 to ensure all workers are afforded adequate protection from identified hazards.

2.9.3. When requested, provide commanders and (or) functional managers with interpretation of requirements for PPE.

2.9.4. When requested, provide commanders and (or) functional managers with referral information for PPE which may be the responsibility of other installation agencies.

**2.10. Bioenvironmental Engineering (BE).** The BE will provide guidance applicable to OH-PPE in the realm of sampling, analysis, and health risk appraisals and (or) hazard evaluations.

2.10.1. A Bioenvironmental Engineer (BEE), or a 7/9-skill level Bioenvironmental Engineering Technician (BEET) at installations where no BE is assigned, will certify that OH-PPE used by US Air Force employees is appropriate for the hazards from each operation (such as respirator, hearing protection, etc.). The BEE and (or) BEET will identify all hazardous workplace operations and prescribe the selection of the proper OH-PPE during baseline, annual, and special purpose surveys according to AFOSH Standard 48-17, *Standardized Occupational Health Program* (formerly designated AFOSH Standard 161-17). The applicable survey (i.e., baseline, annual, or special purpose) report will identify and describe:

2.10.1.1. All hazardous operations or tasks where PPE is required and recommend appropriate controls for adverse exposures.

2.10.1.2. The hazard from which the employee must or should be protected and describe the applicable OSHA, AFOSH, and general industry standards.

2.10.1.3. The specific OH-PPE that must be worn by the employees.

2.10.1.4. The adequacy of the OH-PPE that has been prescribed to protect the employee and any known limitations of the equipment such as breakthrough times, abrasion sensitivity, temperature range, etc.

2.10.1.5. Any other PPE that has been made available to the employee and an analysis of any likely interference or incompatibility between the recommended OH-PPE and the other PPE.

2.10.2. The BEE or BEET will maintain a list for each workplace and for each task or operation where OH-PPE is used. The case file for each workplace where OH-PPE is used which will contain a list of tasks or operations, the potential hazards, the specific OH-PPE worn, and whether each item of PPE is required to be worn, recommended to be worn, or is electively used.

2.10.3. During each baseline survey and annual survey, the BEE will review the list of OH-PPE and compare it with the current operation's potential hazards. If the OH-PPE is adequate to control the potential hazards found, the BEE or BEET will certify the adequacy of the OH-PPE and provide a copy of the certified list with the annual shop survey report. If the OH-PPE cannot be certified, the BEE will recommend actions to resolve the OH-PPE inadequacies. These recommendations include engineering controls, administrative controls, and revisions in the specific OH-PPE for specific tasks or operations. The following list identifies areas of expertise provided by the Bioenvironmental Engineering staff.

2.10.3.1. Hearing protection (ear plugs, muffs, etc.).

2.10.3.2. Respirators (as defined by AFOSH Standard 48-1).

2.10.3.3. Laser eye wear (goggles, glasses, shields, etc.).

2.10.3.4. PPE for ionizing radiation (lead gloves, aprons, etc.).

2.10.3.5. PPE for ultraviolet radiation (goggles, shields, etc.).

2.10.3.6. PPE for heat stress (ice vests, vortex tubes, etc.).

2.10.3.7. PPE for ergonomic stresses (knee pads, arm pads, etc.).

2.10.3.8. Chemical protective clothing (CPC) (gloves, aprons, coveralls, face shields, goggles, etc.).

**2.11. Commanders and (or) Functional Managers.** Will ensure that all workcenters have conducted and properly documented hazard assessments to determine if hazards are present and take appropriate actions necessary to protect workers from injury, illness, or death. They will ensure PPE is not used as a substitute for engineering hazards out, isolating, guarding, or substitution of hazardous chemicals. Only after engineering and administrative controls have been applied to the maximum extent practicable, or until controls can be installed, will PPE be identified as the primary means to protect personnel against residual or operational hazards.

**2.12. Supervisors.** Must conduct and document hazard assessments in each workplace where their employees are performing duties. If PPE is required, the supervisor will ensure that PPE is provided, used, and maintained in a sanitary serviceable condition. They are responsible for maintaining discipline with regard to personnel wearing properly fitted PPE, when required. They will consult the installation ground safety staff and installation BE concerning the selection and use of PPE.

***NOTE:***

All personnel must have job safety training; however, commanders, functional managers, supervisors, and staff members whose work environment is primarily a low-risk administrative area, do not require documentation. Supervisors will document job safety training for all other personnel (refer to AFI 91-301 for further information).

**2.13. Air Force Personnel.** Will:

2.13.1. Promptly report safety, fire, and health hazards to supervision or management.

2.13.2. Comply with PPE requirements on- and off-duty.

2.13.3. Ensure provided PPE is used (when required), adjusted to proper fit, and maintained in sanitary and serviceable condition.

2.13.4. Notify their supervisors if they wear contact lenses (this information is vital to emergency medical personnel who may need to remove lens from the individual's eye).

2.13.5. Notify supervision about any known medical condition or illness, before exposure to hazardous tasks or operations.

## Chapter 3

### GENERAL REQUIREMENTS

**3.1. Eye and Face Protection.** Employees will be provided and use the appropriate eye or face protection when exposed to hazards from flying particles, molten metal, liquid chemicals, corrosives, caustics, chemical gases, vapors, or potentially injurious light radiation. This requirement also applies to management, supervisors, and visitors while they are within the hazardous area. Selection will be based on the kind and degree of hazard present.

**NOTE:**

Whenever a task is above eye level and the worker must look up into the area being worked on, eye protection is required to protect against small particles of falling debris.

3.1.1. Protective equipment must meet the following minimum requirements:

- 3.1.1.1. Provide adequate protection against the particular hazards for which they are designed;
- 3.1.1.2. Be reasonably comfortable when worn under designated conditions;
- 3.1.1.3. Fit snugly without interfering with the movements or vision of the wearer;
- 3.1.1.4. Be durable;
- 3.1.1.5. Be capable of being disinfected (unless disposal items are used);
- 3.1.1.6. Be easily cleanable;
- 3.1.1.7. Be kept clean and in good repair;

**NOTE:**

Protective eye and face devices must comply with the American National Standards Institute (ANSI) Standard Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection.

- 3.1.2. Supervisors will ensure all eye and face protection properly fits their employees before use in hazardous area.
- 3.1.3. Eye and face protection must have the manufacturer's identification clearly marked on the equipment.
- 3.1.4. When limitations or precautions are indicated by the manufacturer, they will be transmitted to the user and strictly observed.
- 3.1.5. Metal framed glasses will be secured with a cord or strap to prevent them from falling into energized circuitry.
- 3.1.6. Safety spectacles are designed with special sturdy frames. Normal street frames with safety lenses are NOT acceptable substitutes and will not be worn.
- 3.1.7. Prescription safety spectacles will only be fitted by qualified optical personnel.
- 3.1.8. Eye goggle headbands that are slack, worn out, sweat soaked, knotted, or twisted will be replaced when they no longer hold the goggles in the proper position.

3.1.9. Employees who wear prescription lenses will be provided eye protection that incorporates the prescription in its design, or will wear eye protection that can be worn over the prescription lenses. The protective equipment must not interfere with the wearer's vision or proper position of the protective equipment.

3.1.10. Contact lenses, of themselves, do not provide eye protection and will not be worn in eye hazard work environments without the use of appropriate safety eyewear. Gas permeable and soft contact lenses may be worn with respirators.

3.1.10.1. If an individual who must wear corrective lenses uses spectacle inserts with a full-face-piece respirator, the spectacle inserts for the respirator will be purchased by the government using a prescription provided by the user.

3.1.10.2. If an individual who must wear corrective lenses elects to wear contact lenses with any respirator, the contact lenses will be purchased by the individual.

3.1.11. When working with potentially injurious light radiation, affected employees will wear PPE with filtered lenses that have a shade number appropriate to the protection required (refer to AFOSH 91-5).

3.1.12. Face shields will only be used as primary eye and face protection in areas where splashing, rather than impact resistance, is the problem. In the case of secondary protection, other protective devices, such as safety goggles will be worn. (29 CFR 1910.133)

3.1.13. Pitted or scratched lenses that reduce visibility will be removed from service and not used.

3.1.14. Reduced vision as a result of dirty lenses can become a contributory factor to a mishap. Employees will clean the lenses of eye protection equipment as frequently as necessary to eliminate visibility impairment.

3.1.15. Previously used PPE should be disinfected before being reissued to another employee.

3.1.16. Employees will maintain and disinfect eye and (or) face protection equipment according to the following instructions:

3.1.16.1. Several methods for disinfecting eye-protective equipment are acceptable. The most effective method is to disassemble the goggles or spectacles and thoroughly clean all parts with soap and warm water. Carefully rinse all traces of soap, and replace defective parts with new ones. Swab thoroughly or immerse all parts for 10 minutes in a solution of germicidal deodorant fungicide. Remove parts from solution and suspend in clean place after air drying at room temperature or with heated air. Do not rinse after removing parts from the solution because this will remove the germicidal residue which retains its effectiveness after drying.

3.1.16.2. Ultraviolet disinfecting equipment or spray type disinfecting solutions may be used in conjunction with the washing procedure.

**3.2. Head Protection.** Personnel working in areas where there is a potential for injury from falling or flying objects, bumping head against a fixed object, or electrical shock or burns shall be provided and use protective helmets. Typical examples of these areas are construction sites and warehouses. Protective helmets must comply with ANSI Standard Z89.1-1986, *Standard for Personnel Protection — Protective Headwear for Industrial Workers — Requirements*.

**3.2.1. Safety Helmets (Hard Hats ).** These helmets provide protection from impact and penetration of falling objects and from high-voltage electric shock and burn. Its main components consist of a protective shell, inside suspension system designed to act as an energy-absorbing mechanism, and a chin strap to secure the helmet to the head. Hard hats shall provide the level of protection specified by ANSI Standard Z89.1. The manufacturer's name, ANSI Z89.1, and the class (A, B, or C) will be identified inside the shell. The crown strap shall form a cradle for supporting the helmet on the wearer's head. The distance between the top of the head and the underside of the shell should be adjusted to the manufacturer's requirement for the particular helmet being used. Any part of the helmet that comes into contact with the wearer's head must not be irritating to the skin. Helmets are available as Type I (with full brim) or type II (without brim but may include a peak). Liners and hoods are available for cold weather use.

**NOTE:**

Special care should be taken when wearing hoods because they restrict a person's peripheral vision. This becomes especially hazardous when personnel are working on elevated surfaces.

**3.2.1.1. ANSI Safety Helmet Classification:**

3.2.1.1.1. Class A. Class A helmets are intended to reduce the force of impact of falling objects and to reduce the danger of contact with exposed low-voltage conductors. Representative sample shells are proof-tested at 2200 volts (phase to ground). Typically used in construction operations.

3.2.1.1.2. Class B. Class B helmets are intended to reduce the force of impact of falling objects and to reduce the danger of contact with exposed high-voltage conductors. Representative sample shells are proof-tested at 20,000 volts (phase to ground). Extensively used by electrical workers.

3.2.1.1.3. Class C. Class C helmets are intended to reduce the force of impact of falling objects. This class offers no electrical protection. Used where there is no danger from electrical hazards.

3.2.1.2. Color Identification. Safety helmets will not be painted since the paint may hide cracks or defects in the outer shell and destroy or degrade the insulating characteristics. Helmets are manufactured in a wide variety of colors and units wishing to specify a particular color helmet must first contact the local ground safety office.

3.2.1.3. Identification Markers. Affix identification markers on shells without making holes through the shell and without the use of any metal parts or metallic labels. (Holes could cause the helmet to fail the electrical insulation test [Class A or B] and degrade the impact design of the helmet.)

**NOTE:**

The wearer should be able to identify the type of helmet by looking inside the shell for the manufacturer, ANSI designation, and class. For example:

Manufacturer's Name

ANSI Z89.1-1986

## Class A

3.2.1.4. Use of Decals. The use of decals on safety helmets is only authorized if approved by the unit's MAJCOM, DRU, or FOA. If approved by the MAJCOM, DRU, or FOA, the following restrictions will apply.

3.2.1.4.1. Decals will be limited to unit or MAJCOM emblems and the individual's name.

3.2.1.4.2. Decals or emblems should be the stick-on type only, no more than 3 inches in nominal diameter.

3.2.1.4.3. Names should be stick-on with each letter no more than 1/2 inch by 1/2 inch.

3.2.1.5. Inspection. Inspect safety helmets prior to each use. Any one of the following defects is cause for immediate removal from service:

3.2.1.5.1. Suspension systems that show evidence of material cracking, tearing, fraying, or other signs of deterioration.

3.2.1.5.2. Any cracks, perforations of brim or shell, deformation of shell, or evidence of exposure to excessive heat, chemicals, or radiation.

3.2.1.5.3. Any accumulation of conductive material on or inside the shell that cannot be removed prior to use. This applies to helmets used in electrical hazardous environments.

3.2.1.6. Maintenance. Do not place objects inside the safety helmets between the shell and the suspension device. This space is designed into the helmet so the impact force will not be transmitted to the head of the wearer.

3.2.1.6.1. Keep safety helmets free of abrasions, scrapes, and nicks and do not deliberately drop, throw, or otherwise abuse them because this causes them to lose their protective qualities. Do not store helmets in direct sunlight as it may have an adverse effect on the degree of protection offered.

### **NOTE:**

Shells constructed of polymer plastics are susceptible to damage from ultraviolet light and gradual chemical degradation. This degradation first appears as a loss of surface gloss called chalking and with further deterioration, the surface will begin to flake away.

3.2.1.6.2. A common method of cleaning shells is dipping them in hot water (approximately 140 degrees Fahrenheit [F]) containing a good detergent for at least 1 minute. Shells should then be scrubbed and rinsed in clear hot water. After rinsing, carefully inspect the shell for any signs of damage. Dry with clean soft cloths or air dry.

3.2.1.6.3. Do not drill ventilation holes in safety helmets.

**3.2.2. Chinstraps.** Chinstraps shall be made of nonconductive material and not be less than 12.7 mm (1/2 inch) in width. An adjustable chin strap is designed to fit under the chin to secure the helmet to the head. Safety helmets are of little use if they do not fit securely on the head and remain in place when impacted by a falling object. The chin strap will be used whenever personnel are in an area where there is a possibility of impact and penetration by falling objects or high-voltage electrical shock and burns.

**3.2.3. Bump Caps .** Bump Caps are constructed of lightweight materials and are designed to provide minimal protection against bump hazards or minor blows to the head. They do not afford adequate protection from high impact forces or penetration by falling objects. Therefore, they shall not be used as a substitute for hard hats. Their use will be determined by supervisors, in conjunction with the installation ground safety staff.

**3.2.4. Hair Protection:**

3.2.4.1. Men and women who work around chains, belts, rotating devices, suction devices, blowers, etc., shall cover their long hair to prevent it from being caught in machinery. While such devices are normally guarded, long hair can fit between the mesh of guards and be drawn into the moving machine parts.

3.2.4.2. The length of hair which poses a hazard varies with the operation performed and the control measures used.

3.2.4.2.1. The supervisor, being most knowledgeable of the operation, should determine what constitutes an acceptable hair length. Normally, hair longer than 4 inches and in proximity to moving components should be considered hazardous. However, the supervisor may request the installation ground safety or BE staffs' assistance.

3.2.4.2.2. Bandannas, hairnets, and turbans may be used, providing they cover the hair completely and do not themselves present a hazard to the wearer. Soft caps may also be used, but should completely cover the hair.

**NOTE:**

The effect of long hair should be considered when conducting a workplace JSA.

**3.3. Hearing Protection.** Exposure to high noise levels can cause hearing loss or impairment, in addition to physical and psychological stress. Specifically designed protection is required, depending on the type of noise encountered and the auditory condition of the employee. AFOSH Standard 48-19, *Hazardous Noise Program*, is the primary Air Force directive on hazardous noise exposure policies, responsibilities, and procedures (including hearing protective device information). Contact the local BEE for information on the Air Force Hearing Protection Program. (29 CFR 1910.95, *Occupational Noise Exposure*.)

**3.4. Respiratory Protection.** References concerning the control of occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, vapors, or in oxygen-deficient environments can be found in AFOSH Standard 48-1 and Title 29 CFR 1910.134. Operations that generate hazardous dusts such as lead, cadmium, beryllium, and asbestos require the use of protective clothing to prevent injury and the spread of contamination. Contact the local BEE for information on the Air Force Respiratory Protection Program or protective clothing requirements for hazardous particles and dusts.

**3.5. Torso Protection.** The torso is the largest exposed area of the body. A variety of protective clothing is available to protect personnel from processes such as heat, hot metals, liquids, impacts, cuts, corrosives, caustics, and radiation. Items such as vests, jackets, aprons, coveralls, and full body suits have been specifically designed for this purpose. Supervisors must take into consideration the hazards involved with an operation before selecting the proper protective equipment. Many times the protection required for a task

is actually a combination of several different pieces of PPE. For example, cloth coveralls protect wood workers against minor cuts and abrasions; however, coveralls alone would be inappropriate for the task of operating a table saw. The addition of a leather apron and eye protection may be more appropriate.

**3.6. Hand and Arm Protection.** When an employee's hands or arms are exposed to hazards such as those from skin absorption of harmful substances, severe cuts, lacerations, abrasions, punctures, chemical burns, or harmful temperature extremes, appropriate hand or arm protection shall be provided and used. Sleeves, padded arm protectors, hand pads, and other items will be worn to protect the hands and arms when hot or sharp materials are handled. There is a wide assortment of gloves, hand pads, sleeves, and wristlets for protection against various hazardous situations. Before purchasing any protective equipment, ensure that the manufacturer's recommended use for the glove matches the particular application and anticipated hazards involved. Supervisors will base the selection of appropriate hand protection on the characteristics required relative to the task to be performed, dexterity required, conditions present, duration of use, frequency, physical stresses, limitations of protective clothing, and degree of exposure to identified hazards.

**3.6.1. Multi-Use Gloves.** These gloves are generally worn to protect the hands from injuries caused by handling sharp or jagged objects, wood, or similar hazard-producing materials. These gloves are usually made of cloth material (such as cotton flannel) with chrome leather palms and fingers or synthetic coating. All-leather gloves are also acceptable.

**NOTE:**

When a supervisor is unable to find the appropriate glove in the Air Force inventory, functional managers and supervisors must use the proper Air Force channels to procure PPE from outside sources. Before purchasing gloves, or any protective clothing (outside Air Force sources) the supervisor will obtain documentation from the manufacturer which indicates that the equipment purchased meets the appropriate test standards for the hazards anticipated.

**3.6.2. Selection of Gloves for Protection Against Chemical Hazards .** Chemical protective gloves will be worn by personnel working in battery shops or where acids, alkalis, organic solvents, and other harmful chemicals are handled. (Consult the TO, the MSDS for each chemical used, and the local BEE for assistance in selecting the proper glove material.)

3.6.2.1. Toxic properties of the chemicals used must be determined and taken into consideration when selecting the proper protective gloves. Example: Some chemicals have the ability to cause local effects on the skin or pass through the skin and cause systemic effects.

3.6.2.2. A glove should be selected on its shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials.

3.6.2.3. Chemical-resistant gloves can be used for most dry powders.

3.6.2.4. Employees must be able to remove gloves in such a manner as to prevent skin contamination.

3.6.2.5. It is important that contaminated PPE, which can not be decontaminated, is disposed of in a manner that protects employees from exposure to hazards. Make sure the disposal of contaminated PPE is consistent with applicable environmental regulations.

**3.6.3. Electrical Worker's Clothing and Equipment:**

3.6.3.1. Insulated Protective Equipment. Personnel who work on energized high voltage circuits or power supply lines will wear electrical worker's nonconductive rubber gloves (with leather outer gloves) as prescribed by TOs, manufacturer's manuals, or other safety directives. Other insulating clothing and equipment, such as blankets, hoods, sleeves, matting, and line tools designed for the voltage levels to be encountered, will be used as required.

3.6.3.1.1. Insulating equipment shall be inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test, along with the inspection.

3.6.3.1.2. Insulating equipment with any of the following defects may not be used:

- A hole, tear, puncture, or cut;
- Ozone cutting or checking;
- An embedded foreign object;
- Any swelling, softening, hardening, or sticky texture or loss of elasticity; or
- Any other defect that damages the insulating properties.

3.6.3.1.3. Insulating equipment found to have defects that might affect its insulating properties shall be removed from service and returned for testing.

3.6.3.1.4. Insulating equipment shall be cleaned as needed to remove foreign substances.

3.6.3.1.5. Insulating equipment shall be stored in such a location and in such a manner as to protect it from light, temperature extremes, excessive humidity, ozone, and other injurious substances and conditions.

3.6.3.2. Electrical Equipment:

3.6.3.2.1. Each item will be clearly marked with proper Class number (refer to table 3.1.), i.e.:

Class 0

Class 1

Class 2

Class 3

Class 4

Type I — for Non-Ozone-resistant equipment other than matting.

Type II — for Ozone-resistant equipment other than matting.

**NOTE:**

Other information such as manufacturer identification and size may also be displayed on the equipment if desired.

3.6.3.2.2. Electrical protective equipment shall be maintained in a safe, reliable condition.

3.6.3.2.3. Maximum use voltages shall conform to those listed in table 3.1.

**3.6.4. Selection of Gloves for Protection Against Electrical Shock or Burn .** Electrical worker's gloves are designed to insulate workers from shock, burns, and other electrical hazards. These gloves will NOT be the only protection provided and will never be used with voltages higher than the insulation rating of the gloves. Workers will ensure that gloves being used have been tested according to this standard.

3.6.4.1. Rubber protective gloves shall never be used without leather outer protective gloves, also referred to as leather gauntlets.

3.6.4.2. Only seamless rubber insulating gloves will be used.

3.6.4.3. Gloves shall be marked clearly and permanently with the name of the manufacturer or supplier, ANSI/American Society for Testing and Materials (ASTM) D120, *Standard Specifications for Rubber Insulating Gloves*, type, size, voltage class, and class color. This marking is found on the cuff portion of the glove.

3.6.4.4. Markings will be nonconducting and not impair the insulating qualities of the equipment.

3.6.4.5. Type II material is equipment other than matting which has been designed to be ozone-resistant. Material used for Type II insulating equipment shall be capable of withstanding an ozone test, with no visible effects. The ozone test shall reliably indicate that the material will resist ozone exposure in actual use. Any visible signs of ozone deterioration of the material, such as checking, cracking, breaks, or pitting, is evidence of failure to meet the requirements for ozone-resistant material.

3.6.4.6. Gloves shall be capable of withstanding the alternating current (AC) proof test voltage specified in table 3.2. after a 16-hour water soak.

3.6.4.7. Procedure for testing gloves:

3.6.4.7.1. Glove (right side out) shall be filled with tap water and immersed in water to a depth that is according to instructions in table 3.2.

3.6.4.7.2. Water shall be added to or removed from the glove, as necessary, so that the water level is the same inside and outside the glove.

3.6.4.7.3. When the AC test is used on gloves, the 60-hertz proof test current may not exceed the values specified in table 3.2. at any time during the test.

3.6.4.7.4. After the 16-hour water soak, the 60-hertz proof test current may exceed the values given in table 3.2. by not more than 2 milliamperes.

**NOTE:**

If equipment has been subjected to a minimum breakdown, a voltage test may not be used for electrical protection.

3.6.4.7.5. Rubber protective gloves shall be visually inspected prior to each use. They will be placed in glove bags and stored in a bin or locker away from tools and materials to prevent damage (refer to ANSI/ASTM D120-79a).

3.6.4.8. Surface irregularities that may be present on all rubber goods because of imperfections on forms or molds or because of inherent difficulties in the manufacturing process and that may

appear as indentations, protuberances, or imbedded foreign material are acceptable under the following conditions:

3.6.4.8.1. The indentation or protuberance blends into a smooth slope when the material is stretched.

3.6.4.8.2. Foreign material remains in place when the insulating material is folded and stretches with the insulating material surrounding it.

3.6.4.8.3. Rubber insulating gloves in storage will be dielectric tested every 12 months. Rubber gloves that are removed from storage and issued to a worker are in active use and shall be tested before first issue and every 6 months thereafter.

3.6.4.8.4. Rubber insulating sleeves will be dielectric tested before first issue and every 12 months thereafter.

3.6.4.8.5. The supervisor will stamp the dates of the dielectric test and issue date on the gloves. The supervisor shall maintain a record of all electrical equipment test dates and establish procedures to control its issue, inspection, testing, and use.

3.6.4.8.6. Rubber insulating equipment meeting the following national consensus standards are deemed to be in compliance with this standard.

- ASTM D120-87, *Specification for Rubber Insulating Gloves*.
- ASTM D178-93 (or D178-88), *Specification for Rubber Insulating Matting*.
- ASTM D1051-87, *Specification for Rubber Insulating Sleeves*. **NOTE:** These standards contain specifications for conducting AC and direct current (DC) proof tests, breakdown test, water soak procedure, and the ozone test mentioned in this standard.

**3.7. Foot and Leg Protection — Safety Shoes, Toe Caps, Leggings, etc.** Protective footwear shall be provided and worn when there is a reasonable possibility of sustaining foot injuries due to heavy or sharp objects and electrical and (or) static electricity considerations. For protection of feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces, workers will use appropriate footguards, safety shoes, or boots and leggings. Leggings protect the lower leg and feet from molten metal or welding sparks. Safety snaps permit their rapid removal.

3.7.1. Supervisors will identify those areas, operations, or occupations which may require protective leg or footwear. All individually issued safety footwear used in Air Force daily operations will meet the requirements of applicable ANSI Z41, *Personal Protection — Protective Footwear*, series standards.

3.7.2. Safety-toe shoes meeting ANSI Z41 standards are clearly identified by the manufacturer with a label or stamp placed on the inside surface of the tongue or quarter lining. There are three classes of safety-toe shoes identified in ANSI Z41; only class 75 shoes are approved for the Air Force. Currently most safety-toe shoes for women meet only class 30 standards. Until class 75 shoes for women are available, the class 30 shoe can be used (29 CFR 1910.136, *Occupational Foot Protection*). Safety shoes will be sturdy and have an impact-resistant toe. In shoes, metal insoles protect against puncture wounds. Additional protection, such as metatarsal guards, may be found necessary in some types of footwear. Nonskid shoes will be worn where floors may be wet or greasy. Electrical hazard shoes are not designed to be a replacement for electrically rated matting in high voltage situations.

These shoes are designed to be used when working on low voltage circuits and, as a secondary means of protection.

**NOTE:**

When exposed to cold temperatures and foot crushing hazards; if cold weather footwear which also provides crushing protection is not available, personnel will be issued footwear which protects against the possibility of frostbite.

**3.8. Chemical Protective Clothing .** The purpose of chemical protective clothing and equipment is to shield or isolate individuals from chemical, physical, and biological hazards that may be encountered during hazardous materials operations. Many chemicals pose invisible hazards and offer no warning properties. It is important for employees to realize that no single protective clothing item can protect against all hazards. Clothing should be used in conjunction with other protective methods such as engineering or administrative controls to limit chemical contact.

**3.8.1. Chemical Protective Clothing Selection.** Supervisors will select chemical protective clothing based on the performance characteristics of the chemical protective clothing relative to the tasks to be performed, conditions present, duration of use, and potential hazards identified. Supervisors must first review TO requirements and MSDS guidance, then verify the proper selection with the installation BEE before original issue. Subsequent issues of chemical protective clothing will not require referral services of the installation BEE if circumstances and chemicals involved have not changed.

**3.8.2. Ensemble Selection Factors:**

3.8.2.1. Hazard Consideration. Chemicals present a variety of hazards such as toxicity, corrosiveness, flammability, reactivity, and oxygen deficiency. Depending on the chemicals present, any combination of hazards may be present.

3.8.2.2. Requirements. Selection of the proper types of chemical protective clothing or equipment will depend on requirements from TOs, MSDSs, and suggested manufacturer's recommendations.

3.8.2.2.1. Check with the installation BEE before purchasing chemical protective clothing or equipment.

3.8.2.2.2. Some chemicals require PPE to be made out of specific materials. Beware of recommendations referring to generic names such as "latex gloves" or "rubber aprons".

3.8.2.2.3. Ensure that PPE is made from specific materials which are designed to protect against specific chemicals for the duration of exposure.

**NOTE:**

For a given type of material, chemical resistance can vary from brand to brand. Generally the thicker the material, the longer it will take for the chemical to permeate it.

3.8.2.3. Chemical Protective Clothing Limitations — Breakthrough Time (see definition, attachment 1). Keep in mind that chemicals allowed to remain on protective clothing or equipment can diffuse through the material, even if it is in storage. Chemical protective clothing that is reused must be cleaned before storage. In some cases it may be more cost effective to select chemical protective clothing with a relatively short breakthrough time and discard it after use.

3.8.2.4. Duration of Exposure. Maximum duration of exposure to a chemical should be considered when selecting chemical protective clothing. For example, the material needed to protect against an occasional splash may have a relatively short breakthrough time (breakthrough time should never be less than 1 hour).

#### 3.8.2.5. Performance Characteristics:

3.8.2.5.1. Resistance to abrasions, cuts, heat, ozone, and punctures or tears may need to be considered to maintain the integrity of the material.

3.8.2.5.2. Flexibility may be an important factor to look at if inflexible equipment interferes with the worker's ability to successfully accomplish their task.

#### 3.8.2.6. Training:

3.8.2.6.1. Supervisors must ensure employees have received the proper training to protect themselves against hazards created by the wear of chemical protective clothing. Heat stress, physical and psychological stress, impaired vision, mobility, and communications can significantly increase the risk of injury. The approach in selecting personal protective clothing must encompass an "ensemble" of clothing and equipment. This clothing and equipment should easily be integrated to provide both an appropriate level of protection and allow workers to carry out assigned duties involving the chemicals. Over-protection as well as under-protection can be hazardous and should be avoided.

3.8.2.6.2. Supervisors will ensure their employees are properly trained on pre-use inspection, maintenance, cleaning, and storage of chemical protective clothing and equipment.

3.8.2.7. Pre-Use Inspection. Typical inspection procedures for chemical protective clothing may include checks for imperfect seams and seals and discrepancies in the material coating (such as: pinholes, rips, tears, surface cracks, malfunctioning closures, and signs of deterioration). Pinholes may be detected by holding the material up to a light in a dark room. Gloves can be checked by inflating the glove and checking to see if the glove holds the pressure or emits bubbles under water. Manufacturer's manuals will be consulted for recommendation for specific points of inspection.

3.8.2.8. Cleaning. Chemical protective clothing that is reused will be cleaned before storage. Residual chemical on the chemical protective clothing can permeate the material during storage and reduce the useful life of the chemical protective clothing. It can also contaminate the inside of the chemical protective clothing.

3.8.2.9. Disposal. The supervisor will ensure that chemical protective clothing which is classified as hazardous waste is discarded, using the correct procedures.

**Table 3.1. Rubber Insulating Equipment Voltage Requirements.**

<i>Class of Equipment</i>	<i>Maximum Use Voltage<sup>1</sup> AC rms</i>	<i>Retest Voltage<sup>2</sup> AC rms</i>	<i>Retest Voltage<sup>2</sup> DC avg.</i>
0.....	1,000	5,000	20,000
.....			

<i>Class of Equipment</i>	<i>Maximum Use Voltage<sup>1</sup> AC rms</i>	<i>Retest Voltage<sup>2</sup> AC rms</i>	<i>Retest Voltage<sup>2</sup> DC avg.</i>
1..... .....	7,500	10,000	40,000
2..... ....	17,000	20,000	50,000
3..... .....	26,500	30,000	60,000
4..... .....	36,000	40,000	70,000

**NOTES:**

1. The maximum use voltage is the AC voltage (rms) classification of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal design voltage is equal to the phase-to-phase voltage on multiphase circuits. However, the phase-to-ground potential is considered to be the nominal design voltage:

(a) If there is no multiphase exposure in a system area and if the voltage exposure is limited to the phase-to-ground potential, or

(b) If the electrical equipment and devices are insulated or isolated or both so that the multiphase exposure on a grounded wye circuit is removed.

2. The proof test voltage shall be applied continuously for at least 1 minute, but no more than 3 minutes.

**Table 3.2. Alternating Current (AC) Proof test Requirements.**

Class of Equipment	Proof test Voltage rms V	Maximum Proof test Current, mA (Gloves Only)			
		267-mm (10.5-in) Glove	356-mm (14-in) Glove	406-mm (16-in) Glove	457-mm (18-in) Glove
0..... .....	5,000	8	12	14	16
1..... .....	10,000	.....	14	16	18
2..... .....	20,000	.....	16	18	20
3..... .....	30,000	.....	18	20	22
4..... .....	40,000	.....	.....	22	24

**Table 3.3. Glove Test -- Water Level.<sup>1,2</sup>**

	<i>AC Proof test</i>		DC Proof test	
Class of Glove	mm.	in.	mm.	in.
0..... .....	38	1.5	38	1.5
1..... .....	38	1.5	51	2.0
2..... .....	64	2.5	76	3.0
3..... .....	89	3.5	102	4.0
4..... .....	127	5.0	153	6.0

**NOTES:**

1. The water level is given as the clearance from the cuff of the glove to the water line, with a tolerance of + or - 13 mm. (+ or - 0.5 in.).
2. If atmospheric conditions make the specified clearances impractical, the clearances may be increased by a maximum of 25 mm. (1 in.).

## Chapter 4

### SPECIFIC REQUIREMENTS

**4.1. Rubber Insulating Matting** . Rubber matting which has been manufactured to withstand a maximum of 3000 volts of electricity to ground is considered insulated.

4.1.1. Insulating matting shall be used near electrical apparatus or circuits in high voltage maintenance areas as an additional safety measure to protect personnel. Insulating matting is for protection against accidental shock only and shall not be depended upon for protection when handling energized wires and circuits. TOs 00-25-232, *Control and Use of Insulating Matting for High-Voltage Application*, and 00-25-234, *General Shop Practice Requirements for Repair Electrical Equipment*, and Military Manual (Mil M) 15562, *Matting or Sheet, Floor Covering, Insulating for High Voltage Application*, provide information and instructions for the control, use, and marking of insulating matting. Approved electrical insulating matting is permanently marked according to Mil M 15562.

4.1.2. Upon request, the supervisor, with the assistance of the installation ground safety staff, will inspect areas where electrical facilities are located and determine whether insulating matting is required for worker protection. Typical examples of high voltage areas where insulating matting is required:

4.1.2.1. Areas where potential shock hazards exist and additional resistance is required.

4.1.2.2. Areas where floor resistance is lowered due to dampness.

4.1.2.3. Areas where high voltages (above 600 volts) may be encountered, such as high voltage consoles.

4.1.2.4. Areas with electrical repair or test benches (shops).

4.1.2.5. Motors.

4.1.2.6. Equipment and control panels.

4.1.3. Cleaning will be accomplished as often as necessary to prevent contamination, utilizing domestic cleaners such as carpet cleaner or any other locally approved cleaner required for special situations.

4.1.4. Insulating matting will be replaced when worn to one-half its original thickness or the manufacturer's suggested replacement requirements.

#### **NOTE:**

Shoes with nails should not be worn on insulating matting.

4.1.5. Insulating matting on floors in front of and around electrical workbenches, high voltage cabinets, switch panels, etc., will be of one continuous length or strip. Where, possible, the matting will continue for 24 inches beyond the end of the equipment. Overlapping at corners is not required if it produces a tripping hazard. If more than one run or strip of matting is required, the activity supervisor will determine the amount needed.

4.1.6. Insulating matting will be seamless and markings will be nonconducting and not impair the insulating qualities of the equipment.

4.1.7. Matting will be capable of withstanding the AC proof test voltage specified in table 3-1 or the DC proof test voltage specified in table 4-1.

4.1.8. The voltage test will be applied continuously for 3 minutes for equipment other than matting and applied continuously for 1 minute on matting.

4.1.9. Insulating matting shall not be used for nonskid applications such as walkways, hall runners, in front of workbenches (nonelectric), or on work-and test-benches, etc. For these applications, general purpose matting shall be used. This is a low-cost matting and is satisfactory for use in areas where shock protection is not required. No certification for use of general purpose matting is required.

## **4.2. Light Reflective Products:**

4.2.1. Light reflective and luminescent materials are particularly effective for reducing mishaps caused by poor visibility or darkness. Reflective coatings are available in the primary safety code colors so standard signs and markings can be made with these materials. Material must remain reflective when wet.

4.2.2. Personnel exposed to vehicle or aircraft traffic during hours of darkness or periods of reduced visibility will be provided and use reflective accessories or will use organizational clothing with sewn-on reflective tape (red or orange reflective colors provide better contrast in a snow or white environment). Security police operations are exempt from this requirement at the option of the local security police commanders in coordination with the installation ground safety staff.

## **4.3. Personal Fall Arrest Systems (Safety Harnesses, Lanyards, Lifelines, and Straps):**

4.3.1. Personal fall arrest systems should be selected to match the particular work situation, and any possible free fall distance should be kept to a minimum. Consideration should be given to the particular work environment encountered, for example:

4.3.1.1. The presence of acids, dirt, moisture, oil grease or other substance can cause deterioration of the fall arrest system's ability to function properly.

4.3.1.2. Wire rope or rope covered wire lanyards and some plastics such as nylon will not be used where there is an electrical hazard.

4.3.1.3. Lanyards that are wet shall not be used near power lines or other locations where exposed to energized electrical sources.

4.3.1.4. Lanyards constructed of rope or synthetic materials and rope-covered lanyards will not be used by personnel performing welding or cutting operations, or in areas where sharp edges, open flames, or excessive heat could present a hazard.

4.3.1.5. Where lanyards, connectors, and life lines are subject to damage by work operations such as welding, chemical cleaning, and sandblasting, the component should be protected, or other securing systems should be used.

4.3.2. Lanyards will be kept as short as reasonably possible to minimize the length of a free fall. Lanyard length must never permit a vertical fall of more than 6 feet, nor contact any lower level. Lanyards will be attached to a dropline, lifeline, or fixed anchorage point by means which will not reduce its required strength.

4.3.3. An energy (shock) absorber component whose primary function is to dissipate energy and limit deceleration forces which the system imposes on the body during fall arrest, will be used with all fall arrest systems. These devices may employ various principles such as deformation, friction, tearing of materials, or breaking of stitches to accomplish energy absorption. An energy absorber may be borne by the user or be a part of a horizontal lifeline subsystem or a vertical lifeline subsystem.

4.3.4. Lanyards that have been subject to *impact loading* from a falling person or weight test will be removed from service and destroyed.

4.3.5. Supervisors must fully evaluate the work conditions and environment before selecting the appropriate personal fall protection system.

4.3.6. Once in use, the system's effectiveness should be monitored, to determine cleaning and maintenance requirements.

4.3.7. Fall protection and rescue equipment may be locally or centrally procured. All equipment purchased will meet or exceed the requirements outlined in ANSI Z359, *Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components*. Only commercially manufactured fall and rescue equipment will be used. The use of "homemade" or modified equipment is strictly prohibited.

4.3.7.1. Equipment purchased will have the manufacturer's name, identification code, and the date of manufacture stamped on the equipment or on a permanently attached tag.

4.3.7.2. The free end of lanyards of synthetic materials will be lightly seared and, in the case of natural fiber rope, will be seized (whipped).

4.3.8. Supervisors must maintain manufacturer's performance testing information for the personal fall arrest system being used. The fall arrest system must meet test requirements of 29 CFR 1926 Subpart M, *Fall Protection*.

4.3.9. It is common practice to interchange lanyards, connectors, lifelines, deceleration devices, and body harnesses since some components wear out sooner than others. However, NOT all components are designed to be interchangeable. For example, a lanyard should never be substituted for the lifeline. Personnel using fall arrest systems will be trained in the safe use of the fall arrest system prior to use. This training will include application limits, proper anchoring and tie-off techniques, estimation of free fall distance, including determination of deceleration distance, and total fall distance to prevent striking a lower level, methods of use, inspection, and storage as well as manufacturer's recommendations.

4.3.10. When personal fall arrest systems are used, the supervisor must ensure that workers can be properly rescued or can rescue themselves should a fall occur.

4.3.11. The availability of rescue personnel, ladders, or other rescue equipment must be considered prior to working in areas which require a fall arrest system.

4.3.12. Considerations for inspections are:

4.3.12.1. Users of fall arrest systems will comply with TO 00-25-245, *OPR Instruction Testing and Inspection Procedures Personnel Safety and Rescue Equipment*, and all manufacturer instructions regarding the inspection, maintenance, cleaning, and storage of the equipment. The using organization will maintain copies of the manufacturer's instructions.

4.3.12.2. Equipment will be inspected by the user before each use. All fall arrest systems will receive a thorough inspection, using the criteria in TO 00-25-245 at least once annually. More frequent inspections may be conducted at the discretion of the using organization.

4.3.12.3. When inspection reveals defects in equipment or damage to or inadequate maintenance of equipment, the equipment will be immediately tagged as “unserviceable” and removed from service and repairs made before being returned to service.

4.3.12.4. Examples of components which must be removed from service:

4.3.12.4.1. Components with an absence of or illegible markings.

4.3.12.4.2. Absence of any elements affecting the equipment form, fit, or function.

4.3.12.4.3. Evidence of defects in or damage to hardware elements including distorted hooks or faulty hook springs; tongues unfitted to shoulder buckles; loose or damaged mountings; non-functioning parts; cracks, sharp edges, deformation, corrosion, chemical attack, excessive heating, alteration, deterioration, contact with acids or other corrosives; and excessive wear.

4.3.12.4.4. Evidence of defects in or damage to straps or ropes including fraying, unsplicing, unlaying, kinking, knotting, roping, broken or pulled stitches, excessive elongation, chemical attack, excessive soiling, cuts, tears, abrasion, mold, undue stretching, alteration, needed or excessive lubrication, excessive aging, contact with fire or other corrosives; internal or external deterioration, and excessive wear.

4.3.12.4.5. Alteration, additions which may effect efficiency, absence of parts, or evidence of defects in, damage to or improper function of mechanical devices and connectors.

4.3.13. Maintenance and storage requirements are:

4.3.13.1. Maintenance and storage of equipment will be conducted by the user organization according to the manufacturer’s instructions. Unique issues, which may arise due to conditions of use, shall be addressed with the manufacturer. The manufacturer’s instructions will be retained for reference.

4.3.13.2. Equipment which is in need of or overdue scheduled maintenance will be tagged as “unserviceable” and immediately removed from service.

4.3.13.3. Equipment will be stored in a manner to preclude damage from environmental factors such as heat, light, excessive moisture, oil, chemicals and their vapors, or other degrading elements.

**4.4. Heat Reflective and Protective Clothing.** Radiant heat is a problem in operations such as heat treating of metals, foundry operations, and heating plants. Heat reflective qualities of clothing and other surfaces are considerably affected by color and surface characteristics. Polished metallic aluminum is an effective surface to reflect radiant heat. Clothing consisting of helmets, suits, gloves, and boots with this type surface are available and should be used when necessary, to prevent heat stress and physical injury. Frequent breaks and drinking plenty of water are critical for the prevention of heat-related injuries.

**NOTE:**

If metallic coating on heat reflective clothing is conductive, it will not be worn where there is the possibility of electrical shock.

**4.5. Cold-Testing and Clothing.** Protective clothing used in cold-testing or storage areas must be adequate to protect the workers from the hazards involved with the task being accomplished and cold temperatures. Supervisors will ensure that JSAs conducted for this type of operation include protection from the hazards involved with working in cold temperatures. Frostbite can be avoided by wearing approved protective clothing and taking frequent breaks to warm body extremities.

**Table 4.1. Direct Current (DC) Proofest Requirements.**

Class of Equipment	Proofest Requirements
0	20,000 V
1	40,000 V
2	50,000 V
3	60,000 V
4	70,000 V

FRANCIS C. GIDEON, JR., Maj Gen, USAF  
Chief of Safety

## Attachment 1

### GLOSSARY OF REFERENCES, ABBREVIATIONS, ACRONYMS, AND TERMS

#### *References*

Air Force Instruction (AFI) 11-206, *General Flight Rules*.

AFI 91-202, *The US Air Force Mishap Prevention Program*.

AFI 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Programs*.

Air Force Occupational Safety and Health (AFOSH) Standard 48-1, *Respiratory Protection Program*.

AFOSH Standard 48-8, *Controlling Exposures for Hazardous Materials*.

AFOSH 48-17, *Standardized Occupational Health Program* (formerly designated as AFOSH Standard 161-17).

AFOSH 48-19, *Hazardous Noise Program*.

AFOSH 91-5, *Welding, Cutting, and Brazing*.

AFOSH 161-10, *Health Hazards Control for Laser Radiation*.

American National Standards Institute (ANSI) Standard Z41, *Personal Protection — Protective Footwear*.

ANSI Z87.1-1989, *Practice for Occupational and Educational Eye and Face Protection*.

ANSI Z89.1-1986, *Standard for Personnel Protection — Protective Headwear for Industrial Workers — Requirements*.

ANSI Z359, *Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components*.

American Society for Testing and Materials (ASTM) D120, *Standard Specifications for Rubber Insulating Gloves*.

ASTM D120-87, *Specification for Rubber Insulating Gloves*.

ASTM D178-93, *Specification for Rubber Insulating Matting*.

ASTM D1051-87, *Specification for Rubber Insulating Sleeves*.

Military Manual (Mil M) 15562, *Matting or Sheet, Floor Covering, Insulating for High Voltage Application*.

National Safety Council *Accident Prevention Manual for Business and Industry*.

Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.95, *Occupational Noise Exposure*.

OSHA Standard 29 1910.132, *Personal Protective Equipment*.

OSHA Standard 29 CFR 1910.133, *Eye and Face Protection*.

OSHA Standard 29 CFR 1910.134, *Respiratory Protection*.

OSHA Standard 29 CFR 1910.135, *Head Protection*.

OSHA Standard 29 CFR 1910.136, *Foot Protection*.  
OSHA Standard 29 CFR 1910.140, *Standards Organizations*.  
OSHA Standard 29 CFR 1910.1030, *Bloodborne Pathogens*.  
OSHA Standard 29 CFR 1926, Subpart M, *Fall Protection*.  
OSHA Standard 3127, *Occupational Exposure to Bloodborne Pathogens*.  
OSHA Standard 3128, *Bloodborne Pathogens and Acute Care Facilities*.  
OSHA Standard 3129, *Controlling Occupational Exposure to Bloodborne Pathogens in Dentistry*.  
OSHA Standard 3130, *Occupational Exposures to Bloodborne Pathogens: Precautions for Emergency Responders*.  
OSHA Standard 3131, *Bloodborne Pathogens and Long-Term Care Workers*.  
Technical Order (TO) 00-25-172, *Ground Servicing of Aircraft and Static Grounding/Bonding*.  
TO 00-25-232, *Control and Use of Insulating Matting for High-Voltage Application*.  
TO 00-25-234, *General Shop Practice Requirements for Repair Electrical Equipment*.  
TO 00-25-245, *OPR Instruction Testing and Inspection Procedures Personnel Safety and Rescue Equipment*.  
TO 1-1-3, *Inspection and Repair of Aircraft Integral Tanks and Fuel Cells*.  
TO 14P3-1-131, *OPN and Maintenance Instruction With IPB — Aircrew Chem-Defense Ensemble*.  
TO 14P3-1-141, *Operation and Maintenance Instructions — Ground Crew Chem-Defense Ensemble*.

### ***Abbreviations and Acronyms***

**AC**—Alternating Current  
**AETC**—Air Force Education and Training Command  
**AFCEA**—Air Force Civil Engineering Support Agency  
**AFI**—Air Force Instruction  
**AFIA**—Air Force Inspection Agency  
**AFMC**—Air Force Materiel Command  
**AFOSH**—Air Force Occupational Safety and Health  
**AFR**—Air Force Regulation (obsolete designation)  
**AFSC**—Air Force Safety Center  
**ANSI**—American National Standards Institute  
**ASTM**—American Society for Testing and Materials  
**BE**—Bioenvironmental Engineering  
**BEE**—Bioenvironmental Engineer  
**BEET**—Bioenvironmental Engineering Technician

**CPC**—Chemical Protective Clothing  
**CFR**—Code of Federal Regulations  
**DC**—Direct Current  
**DRU**—Direct Reporting Unit  
**F**—Fahrenheit  
**FOA**—Field Operating Agency  
**HBV**—Hepatitis B Virus  
**HIV**—Human Immunodeficiency Virus  
**HQ**—Headquarters  
**JSA**—Job Safety Analysis  
**MAJCOM**—Major Command  
**MIL M**—Military Manual  
**MSDS**—Material Safety Data Sheets  
**NFPA**—National Fire Protection Association  
**OH-PPE**—Occupational Health Personal Protective Equipment  
**OSHA**—Occupational Safety and Health Administration  
**PDO**—Publishing Distribution Office  
**PPE**—Personal Protective Equipment  
**TO**—Technical Order  
**USAFSAM**—United States Air Force School of Aerospace Medicine

### ***Terms***

**Back Support Belt**—A belt that is designed to provide lower lumbar and abdominal muscle support when lifting. There is no definitive proof that back support belts serve any protective function therefore the Air Force does not currently recognize back support belts as personal protective equipment. Back support belts must not be worn without supervisory approval and proper training in safe lifting techniques. They will not be relied upon solely to protect the back from injury. Back support belts should be unfastened when the individual is not presently involved in a lifting motion, to prevent the possibility of muscle atrophy from prolonged usage.

**Bloodborne Pathogens**—Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV). Universal precautions **MUST** be observed. Infection control requires the employer and employee to assume that all human blood and specified human body fluids are infectious for HIV, HBV, and other bloodborne pathogens. Where differentiation of types of body fluids is difficult, all body fluids are to be considered as potentially infectious. Any person in the performance of their duties who could reasonably be expected to come in contact with blood or other potentially infectious materials must be trained according to OSHA 1910.1030.

**Body and (or) Hand Protection**—Any glove, finger guard, arm protector, apron, bib, or garment designed to protect the body, arms, hands, or fingers from contamination or injury due to absorption or physical contact.

**Body Harness**—A design of simple or compound straps that may be secured about the wearer so the stopping forces are distributed over the thighs, buttocks, chest, and shoulders, or any combination thereof. Provisions for attaching a lanyard in the back between the shoulder blades and top of the shoulder level are included.

**Breakthrough Time**—The time required for a specific chemical to permeate through a particular brand of protective clothing or equipment.

**Chemical Protective Clothing**—Chemical protective clothing is intended to isolate the worker from contact with chemicals. It may include items such as: hoods, face shields, chemical goggles, jackets, coats, aprons, bib overalls, coveralls, splash suits, boots, shoe covers, and full body encapsulating suits.

**Corrective Lens**—A lens manufactured to the wearer's individual corrective prescription.

**Deceleration Device**—Any mechanism, such as a ropegrab, ripstitch lanyard, or specifically woven lanyard, which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy imposed on an employee during fall arrest.

**Deceleration Distance**—The additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or harness point at the moment of activation of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

**Dropline**—A vertical line attached to a fixed anchorage to which a lanyard is affixed.

**Electrical Worker Personal Protection Devices**—Equipment designed to protect against electrical shock while working on electrically energized circuits. Includes rubber insulating matting, blankets, line hose, gloves, sleeves, rain gear, footwear, safety belts, lanyards and lifelines, and special handtools.

**Eye and (or) Face Protectors**—This equipment includes spectacles and goggles (with and without lenses), face shields, and hoods.

**Eye Hazard Area and (or) Task**—A location or task where liquids, vapors, dusts, particles, light, heat, or other situations exist that require eye protective devices and extra precautions by personnel. Examples of eye hazards are splashes or mists from fuels, corrosive or toxic chemicals or other liquids; particles of metals from grinding, cutting, or welding; dusts; and harmful exposure to radiant light sources such as welding; infrared or laser light beam operations; or a combination of these hazards.

**Face Shield**—A device worn in front of the eyes and a portion of, or all of, the face.

**Fixed Anchorage**—A secure point of attachment, not part of the work surface, for droplines, lifelines, or lanyards. An approved fixed anchorage will be capable of supporting minimum deadweight of 5,000 pounds (per person).

**Foot Protector**—A product designed to protect the foot from injury due to moderate impact; abrasions; cuts, burns, or corrosive, caustic, or toxic materials; freezing; absorption; or dampness.

**Free Fall distance**—The vertical displacement of the fall arrest attachment point on the employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall.

**Goggle**—A device which protects the eyes and eye sockets. They have contour-shaped eyecups or full facial contact, glass or plastic lenses, and are held in place by a headband or other suitable means.

**Head Protection**—A device that is worn to provide protection to employees when there is the potential for injury to the head from impact and penetration from flying, falling, or stationary objects or limited electrical shock, heat, or burn. Protection includes a suitable chin strap and harness to secure the helmet to the head.

**Job Safety Analysis (JSA)**—Procedure used by supervisors and employees to assess the hazards associated with a work procedure and determine the safest, most efficient means of accomplishing a given task. The use of PPE is sometimes the best method of mitigating a particular hazard. Specific documentation is required. The prescribing directives for conducting JSAs are AFIs 91-202, 91-301, and OSHA Standard 29 CFR 1910.132. Refer to paragraph 1.2 and attachment 2 for further information.

**Lanyard**—A flexible line used to secure a wearer of a safety belt or harness to a dropline, lifeline, or fixed anchorage.

**Lifeline**—A horizontal line between two fixed anchorages to which the lanyard is secured either by tying off or a suitable sliding connection. An approved lifeline will be capable of supporting a minimum deadweight of 5,400 pounds (per person) applied at the center of the lifeline.

**May**—Indicates an acceptable or satisfactory method of accomplishment.

**Plano**—A lens that does not incorporate correction.

**Rope Grab**—A deceleration device which travels on a lifeline and automatically frictionally engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam and (or) lever locking, or both.

**Self-Retracting Lifeline and (or) Lanyard**—A deceleration device which contains a drum-wound line which may be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement and which, after onset of a fall, automatically locks the drum and arrests the fall.

**Shall**—Indicates a mandatory requirement.

**Shield**—A transparent guard supported without the aid of the operator. Its function is to protect the eyes.

**Should**—Indicates a preferred method of accomplishment.

**Sideshield**—A device of metal or plastic (or both) or other material, hinged or fixed firmly to the spectacle to protect the eye from side exposure.

**Spectacle Safety**—A device patterned after conventional type spectacle eyewear but of more substantial construction. They may be equipped with sideshields. The lenses can be plano- or corrective-protective. They may be made of clear or absorptive filter glass or plastic.

**Suspension Belt**—A design of simple or compound straps that may be secured about the wearer's body as an independent work support. These are commonly referred to as saddle belts or tree trimmer's belts. Suspension belts do not provide fall protection.

**Will**—Is also used to indicate a mandatory requirement and to express a declaration of intent, probability, or determination.

**Wire Rope**—A rope composed of steel wires, strands, and a core. The individual wires are cold drawn to predetermined size and breaking loads according to use. They are then helically laid or formed around the

core, which may be sisal or synthetic fiber, a metallic strand, or an independent wire rope. The size, number, and arrangement of wires, the number of strands, the lay, and the type of core in a rope are determined by the service for which the rope is to be used.

**Wrist Harness.**—An emergency device used to secure an individual in a confined space or when rescue movement is restricted.

## **Attachment 2**

### **JOB SAFETY ANALYSIS GUIDE**

JOB:

DATE:

WORKCENTER:

SUPERVISOR:

TITLE OF WORKER WHO DOES TASK:

REQUIRED PERSONAL PROTECTIVE EQUIPMENT (PPE):

ANALYSIS BY:

*REVIEWED BY:*

#### **1. SEQUENCE OF BASIC STEPS:**

Break the task down into its basic steps. For example, what is done first, what is done next, and so on. You can do this by: (1) observing the task, (2) discussing it with workers, (3) using your experience and knowledge of the task, or (4) a combination of all three. Record the steps in the task in their normal order of occurrence. Describe what is done; not the details or how it is done. Three or four words are normally enough to describe each step in the task.

#### **2. POTENTIAL MISHAP CAUSES OR HAZARDS:**

For each task step, ask yourself what mishap could happen to workers performing the task and what the probability would be of the mishap occurring. Get the answers by: (1) observing the task, (2) discussing the task with workers, and (or) (3) using “lessons learned” from other mishaps. Ask the questions:

- a. Can workers be struck by or contacted by anything?
- b. Can they strike against or come in contact with any item which can cause injury?
- c. Can they be caught in or between anything?
- d. Can they fall?
- e. Can they overexert?
- f. Are they required to do repetitive lifting or heavy lifting?
- g. Are they exposed to potential hazards such as toxic gases, chemicals, radiation, or noise?

#### **3. RECOMMENDED SAFE TASK PROCEDURE:**

For each identified potential mishap cause or hazard, consider the following questions:

- a. How should the workers perform the task step to avoid the mishap or eliminate the potential hazard?
- b. What can be done to eliminate or mitigate the hazard by redesigning the work area or equipment?
- c. How can the procedure be modified to eliminate the hazard?

Be sure to describe in detail the precautions workers must take and ensure that these steps are placed in the task procedure or checklist. Take special care that important steps or details are not inadvertently omitted from the task. Ensure that the guidance is clear and specific and easily understood by workers.

**NOTE:** Requirements in paragraph 1.2.1. must be included in the JSA.

## **Attachment 3**

### **CHECKLIST--PERSONAL PROTECTIVE EQUIPMENT**

This is not an all-inclusive checklist. It simply highlights some critical items in this standard. Other requirements exist that are not included in the checklist. Where appropriate, MAJCOMs, DRUs, FOAs, local safety personnel, and supervisors will add to this checklist to include command or individual shop-unique requirements or situations.

1. Has the supervisor conducted and documented a job safety analysis (JSA) to identify hazards and PPE required for a particular task? (Reference paragraph 1.1.1.)
2. When PPE is required, is the identified or potential hazard matched to the proper protective devices? (Reference paragraph 1.1.2.)
3. Has OH-PPE been certified by the BEE? (Reference paragraph 2.10.1.)
4. Do supervisors ensure that PPE is provided, used, and maintained in a sanitary serviceable condition? (Reference paragraph 2.12.)
5. Do supervisors maintain discipline with regard to personnel wearing properly fitted PPE? (Reference paragraph 2.12.)
6. Are supervisors advising their workers that it is mandatory for them to comply with PPE requirements on- and off-duty? (Reference paragraph 2.13.2).
7. Have workers who wear contact lenses notified their supervisors? This information is vital to emergency medical personnel who may need to remove lens from the individual's eye. (Reference paragraph 2.13.4).
8. Has the worker notified their supervisor about any known medical condition or illness they may have that could affect their ability to perform a hazardous task or operation? (Reference paragraph 2.13.5).
9. Are employees provided the appropriate eye or face protection when exposed to hazards from flying particles, molten metal, liquid chemicals, corrosives, caustics, chemical gases, vapors, or potentially injurious light radiation? (Reference paragraph 3.1)
10. Is there an established policy which requires management, supervisors, and visitors to wear the appropriate PPE while they are within a hazardous area? (Reference paragraph 3.1)
11. Are personnel working in areas where there is a potential for injury from falling or flying objects, bumping head against a fixed object, or electrical shock or burns provided protective helmets? (Reference paragraph 3.2.)
12. Do protective helmets have the manufacturer's name, ANSI Z89.1, and the class (A, B, or C) identified inside the shell? (Reference paragraph 3.2.1.)
13. Do employees who work around chains, belts, rotating devices, suction devices, blowers, etc., cover their long hair to prevent it from being caught in machinery? (Reference paragraph 3.2.4.1).
14. Exposure to high noise levels can cause hearing loss or impairment, in addition to physical and psychological stress. Is specifically designed hearing protection (depending on the type of noise encountered

and the auditory condition of the employee) provided for employees in areas where required by AFOSH Standard 48-19, *Hazardous Noise Program*? (Reference paragraph 3.3).

15. When an operation is suspected of generating hazardous dusts or air-borne contaminants, is the local BEE contacted for advice on the proper respirator protection to use, prior to exposing personnel to the potentially hazardous atmosphere? (Reference paragraph 3.4)

16. When an employee's hands or arms are exposed to hazards such as those from skin absorption of harmful substances, severe cuts, lacerations, abrasions, punctures, chemical burns, or harmful temperature extremes, is the appropriate hand or arm protection provided? (Reference paragraph 3.6)

17. Are chemical protective gloves worn by personnel working where acids, alkalis, organic solvents, and other harmful chemicals are handled? (Consult the proper MSDS chemical protective requirements for the particular chemical which employees are being exposed.) (Reference paragraph 3.6.2).

18. Are employees able to remove rubber protective gloves in such a manner as to prevent skin contamination? (Reference paragraph 3.6.2.4)

19. Is contaminated PPE, which can not be decontaminated, disposed of in a manner that protects employees from exposure to hazards? (Reference paragraph 3.6.2.5)

20. Is protective footwear provided and worn when there is a reasonable possibility of sustaining foot injuries? (Reference paragraph 3.7)

21. Are other protective methods such as engineering or administrative controls used to limit the possibility of employees coming in contact with hazardous chemicals? (Reference paragraph 3.8)

22. Do supervisors select chemical protective clothing based on the performance characteristics of the chemical protective clothing relative to the tasks to be performed, conditions present, duration of use, and potential hazards identified? (Reference paragraph 3.8.1)

23. Do supervisors first review MSDS requirements, then verify the proper selection of chemical protective clothing with the installation BEE before original issue? (Reference paragraph 3.8.1)

24. Are supervisors aware that subsequent issues of chemical protective clothing do not require referral services of the installation BEE if circumstances and chemicals involved have not changed? (Reference paragraph 3.8.1 )

25. Are personnel exposed to vehicle or aircraft traffic during hours of darkness or periods of reduced visibility provided reflective accessories? (Security police operations are exempt from this requirement at the option of the local security police commanders in coordination with the installation ground safety staff.) (Reference paragraph 4.2.2.)

26. Has the supervisor maintained the manufacturer's performance testing information for the personal fall arrest system being used? (Reference paragraph 4.3.8).

27. Does the user organization maintain and store equipment according to the manufacturer's instructions? (Reference paragraph 4.3.13.1).

28. Is equipment, which is in need of or overdue scheduled maintenance, tagged as "unserviceable" and immediately removed from service? (Reference paragraph 4.3.13.2.)

29. In the absence of manufacturer's instruction is equipment stored in a manner which precludes damage from environmental factors such as heat, light, excessive moisture, oil, chemicals and their vapors, or other degrading elements? (Reference paragraph 4.3.13.3.)

30. Do supervisors provide frequent breaks and ensure employees drink plenty of water when employees are exposed to work environments where heat is a problem? (Reference paragraph 4.4.)
31. Do supervisors ensure that the proper cold weather clothing been provided for working in cold temperatures? (Reference paragraph 4.5)
32. When working in cold temperatures, are frequent breaks allowed so workers may warm body extremities? (Reference paragraph 4.5)